

# SCIENCE

A WEEKLY NEWSPAPER OF ALL THE ADVANCES IN THE SCIENCES.

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Can any reader of *Science* cite a case of lightning stroke in which the dissipation of a small conductor (one-sixteenth of an inch in diameter, say,) has failed to protect between two horizontal planes passing through its upper and lower ends respectively? Plenty of cases have been found which show that when the conductor is dissipated the building is not injured to the extent explained (for many of these see volumes of Philosophical Transactions at the time when lightning was attracting the attention of the Royal Society), but not an exception is yet known, although this query has been published far and wide among electricians.

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# SCIENCE

NEW YORK, JANUARY 22, 1892.

## "DIVINE HEALING."<sup>1</sup>

ABOUT twenty years ago a half-educated trifler from Germany, babbling, as they all do now, a travesty of undigested "metaphysical philosophy" displayed in a nimbus of religious cant, concerning whom the most injurious reports were circulated and have never been contradicted—this man became the apostle of a large following, and the worthy founder of the most notorious of the "schools" spawning ever since in the shallow waters of "Christian science," and there is of late a pitiful increase of faith, particularly on the part of religious people, in the prayers, promises and neglect of these healers, until cancer, diphtheria, and typhoid are left without challenge or remorse in the control of "Divine Healers," "Christian Scientists," "Faith" and "Mind Curers," and "inspired" persons in all garbs, who advertise variously, while each calls all others "quack."

Here is a "philosophy" which literally insists that there is neither pain nor disease;<sup>2</sup> cancer is an imagination. How patient, after all, are our legislators!

Serious argument against the hypocritical nonsense of these parasites in the medical profession would hardly have seemed called for, — so silly is the silliness, so crazy the craze, — were it not true that their influence is widely and perniciously felt. As keen an observer as Mr. Edward Eggleston has thought the status of "Christian Science" so serious an evil that his last work, "The Faith Doctor," is a strong indictment of its murderous counsels.

Popularity is easily gained, for the dead tell no tales. Christian Science murmurs its experimental prayer over the sick as material, while its triumphal march gathers a noisy ovation from the imaginative, the neurotic, the convalescing, and from certain surgical cases, stiff-jointed, rheumatic, or weak, and simply needing reassurance to take up beds and walk. From New England to the extreme West, towns and communities swarm with the new "practitioners." "The number of these regularly graduated cannot be accurately estimated, but they are numbered by the thousand. Within the limits of one school there are about thirty organized churches, and also one hundred and twenty societies which maintain regular services."<sup>3</sup>

Numerous periodicals make their appeal in such priestly vestments as have never been assumed by *Ayer's Almanac* or the most plausible of the *Guides to Health*. Twenty-three institutes, scientific and metaphysical, are advertised in one periodical.<sup>4</sup>

Here whoever listens becomes a titled practitioner (C.S.) and is "inspired," however brief the course of instruction. "There are about fifty dispensaries and reading-rooms, and

<sup>1</sup> A portion of this paper was published in Boston Transcript, Dec. 21, 1891, in reply to a communication, Boston Transcript, Nov. 7, favoring Divine Healing as "the more excellent way."

<sup>2</sup> "Science and Health," pp. 188, 190, 231, etc. "You say a boil is inflamed and painful, but that is impossible" (231). "Inflammation, tubercles, hemorrhage and decomposition are but thoughts, beliefs" (188).

<sup>3</sup> American Spectator, Dec., 1891.

<sup>4</sup> Christian Science Journal, Jan., 1892.

a rapidly increasing literature for Christian Science; one of the other schools, Mind Cure, has also a large number of organizations similar in character."<sup>5</sup>

Reputable physicians occasionally yield to the importunities of patients, or the specious argument from the assumed standpoint of religion, and endorse the practice of Faith Cure, wholly or in part. Given an inch, an ell is taken, and the fanatical statement has already been made that there exists no opposition to Divine Healing on the part of medical men.<sup>6</sup>

Yet every veracious medical article and authentic report written during the past decade to show the service of air, diet, exercise, baths, or medication, is the enlightened protest of science, i.e., of confirmed and verified experience, in opposition to sensational, hysterical, superstitious pseudo-science.

Concession on the part of any physician to the childish credulity of a bygone age is simply high treason to his noble profession. A medical man who is still conducting cases of successful treatment should reflect upon his ingratitude to Alma Mater, and upon the comment which must greet a step which seems to stultify his own professional life and give support to a dangerous class in the community. His colleagues will, inevitably, question his sincerity and ask for a logical defense.

Religious observances have their time and place, but the Almighty evidently always employs means; the preachers are accepted agents in matters spiritual, perhaps the doctors are the convenient instruments to cure disease.

A disorder so serious, visible, established, and contagious as diphtheria, is not to be left to faith and prayer alone. The writer has never seen a cure wrought by such agency; but he has met with several instances where, in this disease, faith without works has brought about a most disastrous result. Prayer accompanying unskilled attendance in childhood has proved to be infanticide.

The fact remains (statistics are stubborn) that "The Prayer Test" submitted some years ago was unsuccessful in application, both here and in England, and it is not now referred to by those who so confidently offered it.

Consumption is unwisely chosen as a chief example of the hopelessly incurable, therefore to be abandoned to prayer.<sup>7</sup> Dr. Cullis has here failed to help;<sup>8</sup> the bacteria still defy his methods. But medical science accomplishes very much in this disease, more and more from year to year. Even the removal of patients to antiseptic air and a warmer climate completely cures in many instances. Dr. Burnett recently reported fifty cases of advanced consumption of the lungs cured in England in spite of the climate, and medical authorities are nearly unanimous in promising aid at early stages of phthisis. Why should we, so equipped with books, professional training, experience, and a sense of responsibility toward our fellows, abandon the care of consumption to the pseudo-scientists?

<sup>5</sup> Am. Spectator, Dec., 1891.

<sup>6</sup> Journal of the Evangelical Alliance, Nov. 14, 1891.

<sup>7</sup> Boston Transcript, Nov. 7; Chr. Science Journal, Jan., 1892; Science and Health, p. 188.

<sup>8</sup> In the Consumptives' Home, a large faith institute, located in Boston.

It is most emphatically true, and to be recognized by every thoughtful mind abreast with the currents of modern life, that, underneath all the enormous quackery and folly of the healers, there are certain tendencies in the movement which are true and which have given to it power and influence. An influence early seen among us, and which, we trust, will be perpetuated as a final boon to the sick, was the leading of popular thought, in a hard and sceptical time, into a more spiritual conception of disease. Rightly applied, and by educated persons, such forces in nature as mesmerism (hitherto misapplied), and the still questionable hypnotism, seem destined to be of inestimable service in the treatment of all sickness, most obviously in disturbances of the nervous system.

Happily,

"The qualities that soothe and heal and bless  
Are scattered at the feet of men like flowers."

There are men and women everywhere who forget fear and self and give out their beautiful life to the sick. No intelligent physician now neglects the mental, even the psychic states of his patients. Subtle gifts and powers are seen in the highest, or philanthropic, type of the medical man; fortunate is the patient whose doctor adds all noble ways and works to his professional acquirements. Abercrombie, Bigelow, and Clark were, temperamentally, sunshine, faith, patience, and hope.

Such ministrations are, however, but accessory to medical treatment, and should not arrogate the powers and functions of science,

"For who shall change, by prayers or thanksgivings,  
The mystery of the cruelty of things?"

When the son of Mr. Moody, the revivalist, lay sick of scarlet fever, Mr. Moody's daily prayer, thousands helping him in the great tabernacle, was for the doctor's guidance. "May my boy's doctor be directed, and may he save my child!" That doctor's attitude toward revivals was so questionable that the boy's cure by prayer in this partnership was one among numerous modern miracles. But the M.D.'s chosen by D.D.'s are quite apt to be unbelievers. Even missionaries are shockingly delinquent in this matter, and waste no time by employing the mongrel attachés who follow the fathers, if only a scoffer full of knowledge be at hand. How often has the writer seen this wise prudence exercised by the mission leaders of the Sandwich Islands.

Perchance, to aid us all, a class of honest healers or helpers will at last arise whose representatives may not call themselves divine, and may not assume to cure all contagious and organic disease.

I venture, finally, to apply to the mental healers(?) words of an eloquent writer directed against others accused of like delinquency: "They trust to nature, which cannot, like an intelligent surgeon, bring together the gaping lips of a wound, and by their union effect a cure; which, not knowing how to tie a wounded artery, suffers a man in full health and energy to bleed to death; which, in order to remove a splinter from the cornea, destroys the whole eye by suppuration. In an affair so important as that of healing, a profession requiring such intelligence, judgment, and skill, how could they blindly take the vital power for their best instructor and guide, whilst reflective reason and unfettered judgment, those magnificent gifts of the Deity, have been granted to man to enable him infinitely to surpass its performances for the benefit of mankind?"

C. F. NICHOLS, M.D.

#### NOTES AND NEWS.

THE *Illustrated American* says: "It has been decided that it is necessary to send an expedition to Greenland this year to rescue Mr. Peary and his party. The necessity being admitted no one will object to the relief expedition. But it does seem proper to recall some of the conditions under which the original party started. Mr. Peary sought, before his departure, to inspire the belief that the difficulties encountered by previous Arctic explorers would be avoided in a large measure. In this position he was sustained to some extent by the wonderful journey across Greenland performed by Dr. Fridtjof Nansen. After passing the barriers of snow and ice on the coast, he hoped to travel over the snow plains of the interior without difficulty on the *skier* that served Dr. Nansen so well. After the expedition started it was discovered that he had taken too rosy a view of the prospect. His arrangements were not so complete as they should have been; so simple a matter as obtaining the co-operation of the Danish Government, and the assistance of the officials in Greenland, had been overlooked. When the party that accompanied him to Greenland returned, grave apprehension for the safety of himself and his companions was felt. And the feeling of apprehension becomes intensified when it is remembered that one of the persons thus subjected to unnecessary risks of suffering, starvation, and perhaps death among Arctic snow wilderness is a woman, Mr. Peary's brave wife."

— We learn from *Mind* that the second session of the International Congress of Experimental Psychology will be held in London, on Tuesday, Aug. 2, 1893, and the three following days, under the presidency of Professor Henry Sidgwick. Arrangements have already been made by which the main branches of contemporary psychological research will be represented. In addition to the chief lines of investigation comprising the general experimental study of psychical phenomena in the normal human mind, it is intended to bring into prominence such kindred departments of research as the neurological consideration of the cerebral conditions of mental processes; the study of the lower forms of mind in the infant, in the lower races of mankind, and in animals, together with the connected laws of heredity; also the pathology of mind and criminology. Certain aspects of recent hypnotic research will also be discussed, and reports will be given in of the results of the census of hallucinations which it was decided to carry out at the first session of the congress (Paris, 1889). Among those who have already promised to take part in the proceedings of the congress may be named the following: Professor Beaunis, Monsieur A. Binet, Professor Pierre Janet, Professor Th. Ribot, and Professor Richet (France); Professor Lombroso (Italy); Dr. Goldscheider, Dr. Hugo Münsterberg, Professor G. E. Müller, Professor W. Preyer, and Dr. Baron von Schrenk-Notzing (Germany); Professor Alfred Lehmann (Denmark); Professor N. Grote and Professor N. Lange (Russia); Dr. Donaldson, Professor W. James, and Professor Stanley Hall (United States of America); and Professor V. Horsley, Dr. Ch. Mercier, and Dr. G. J. Romanes (England). It is also hoped that Dr. A. Bain, Professor E. Hering, and others, may be able to take part in the proceedings; and that some, as Professor W. Wundt, who will not be able to attend the congress, may send papers. As a specimen of the work that will be done it may be said that Professor Beaunis will deal with Psychological Questioning; Monsieur Binet with some aspect of The Psychology of Insects; Dr. Donaldson with Laura Bridgman; Professor Stanley Hall with Recent Researches in the Psychology of the Skin; Professor Horsley with The Degree of Localization of Movements and Correlative Sensations; Professor Pierre Janet with Loss of Volitional Power; Professor N. Lange with Some Experiments and Theories concerning the Association of Ideas; Professor Lombroso with The Sensibility of Women, Normal, Insane, and Criminal; Dr. Münsterberg with Complex Feelings of Pleasure and Pain; and Professor Richet with The Future of Psychology. A committee of reception has been formed, which includes, among others, the following names: Dr. A. Bain, Dr. D. Ferrier, Mr. F. Galton, Dr. Shadworth Hodgson, Professor V. Horsley, Dr. Hughlings Jackson, Dr. Charles Mercier, Professor Croom Robertson, Dr. G. J. Romanes, Mr. Herbert Spencer, Mr.



G. F. Stout, Dr. J. Ward, and Dr. de Watteville. The fee for attendance at the congress is ten shillings. Arrangements will be made for the accommodation of foreign members of the congress at a moderate expense. Communications are invited, which should be sent to one of the honorary secretaries (F. W. H. Myers, Leckhampton House, Cambridge; or James Sully, East Heath Road, Hampstead, London, N.W.) not later than the end of June, and as much earlier than that date as possible. The communication should be accompanied by a *résumé* of its contents for the use of members.

— In a recent number of the *Revue Médicale de la Suisse Romande*, Dr. Grandjean has related a case of very great interest. It is that of a man of thirty-four, who, with the exception of an attack of somnambulism at the age of eight — an attack in which he had walked into his father's bedroom and congratulated him on being elected king of Italy — had been previously healthy. Towards the end of January, 1890, he began to suffer from nightmare and depression, without apparent cause, but he had no headache or vomiting. This condition persisted for two weeks. Then, on Feb. 9, after going to his office and working as usual, at nine o'clock in the morning he took his hat, set out on foot, and arrived at Payerne, a village fifty kilometres distant. He had no recollection of anything that happened from the time he left his office until he awoke, in the middle of the night, in an inn at Payerne. His boots, he found, were much worn, but his clothes were in good order. He presented none of the usual effects of having passed through an epileptic paroxysm, except that he had a violent headache. After this he remained as usual for seven months, except that he had occasional "absences." Thus, on one occasion, while writing, he was surprised to find that he had continued at his work for an hour without any recollection of having done so. The work was done perfectly, without a single mistake. At the end of the seven months he had another attack similar to the first, but lasting for two days, during which he had gone about to different places acting in a manner which did not strike any observer as strange or peculiar, but being all the time unconscious. Five months later he had a similar, even more elaborate, attack, which also lasted for two days, and was followed by headache more violent than usual. Dr. Grandjean comes to the conclusion that this is undoubtedly a case of epileptic automatism. He does so from the nature of the attacks, from the fact that the man also suffered from "absences" of longer or shorter duration, really attacks of *petit mal*, and because the latter became almost totally suppressed under treatment by the bromides. The case is an important one, and it should serve to impress the fact once more that some criminals who profess complete unconsciousness of the act or acts with which they are charged may really be the subjects of epileptic automatism. If this patient had committed some crime during one of those periods of unconsciousness, a defence to the effect that he was the subject of epilepsy would have been received with considerable doubt, especially as there was nothing in the nature of a severe fit to point to in the former history, but only those temporary "absences" without any obvious convulsion.

— At the meeting of the Chemical Society of Washington, Jan. 14, Professor H. W. Wiley presented a paper on "Midzu-ame." The sample of midzu-ame or Japanese glucose analyzed by Professor Wiley was brought to the laboratory of the Agricultural Department by Dr. W. St. George Elliot, having been sent to him from Yokohama by Mr. J. H. Loomis. A sample of heavy confectioner's glucose was analyzed at the same time and the two compared. The characteristic of the midzu-ame is its high percentage of maltose, nearly all of the reducing sugar present being maltose. The ash of the midzu-ame contained only a trace of sulphates, no lime, no chlorium, and was strongly alkaline. The ash of the confectioner's glucose contained large quantities of sulphates, very little lime, and was also alkaline. The pleasant flavor of the midzu-ame seems to render it preferable to glucose for confectioners' use, and Professor Wiley thought it may be destined to have an important future in this respect. He referred to its use in Japan, where it has been used for medical purposes with dialyzed iron and cod liver oil. Its only advantage over

maltine is its easy digestibility. Professor Wiley also described the methods of manufacture in Japan as given by Dr. J. C. Berry and by Mr. Loomis. W. F. Hillebrand, in his paper on "Zinc-bearing Spring Waters from Missouri," described the springs as issuing from a low bluff a few miles south-west of Joplin, and their chief constituent as zinc sulphate, amounting to three hundred parts per million in a total weight of less than twice that amount of salts. Cadmium, lead, and copper were found in small quantity, and the other constituents were sulphates of calcium, magnesium, sodium, potassium, manganese, aluminium, and iron; also calcium carbonate, silica, and a small amount of sodium chloride.

— Professor Albert A. Michelson of Clark University has been invited by the International Bureau of Weights and Measures to spend the coming summer at the Bureau's laboratory at Breteuil, near Paris, for the purpose of establishing a metric standard in terms of wave lengths of light. Of the three methods of determining a standard of length, the measuring a quadrant of the earth's circumference, the oscillation of a pendulum under given conditions, and the length of light waves at a given line in the spectrum, the last is the most accurate and has the advantage of being a cosmic rather than terrestrial standard. In his original paper explaining the method, Professor Michelson had the co-operation of Professor Morley of Cleveland. The invitation of the International Committee has been accepted by Professor Michelson with the informal approval of the president and trustees of Clark University. Their formal action in granting him leave of absence only awaits the arrival of official papers from Paris and Berlin. The order for the additional new apparatus has been placed with the American Watch and Tool Company of Waltham and with Mr. Brashier of Pittsburgh. The working drawings have been made by F. L. C. Wardwell. Professor B. A. Gould of Cambridge, the well-known astronomer and American representative of the International Congress of Weights and Measures, writes to President Hall as follows: "The proposed investigation is a magnificent one, audacious, yet already proved by Professor Michelson to be feasible. The honor inuring to our country by the selection of an American professor to carry it out and an American artist for constructing an apparatus requiring such surpassing delicacy is one which, I am confident, you will appreciate as highly as I do. It is my conviction that the assent of Clark University will not only redound to its high honor and be gratefully recognized throughout the civilized world, but will constitute an enduring title to remembrance and full appreciation in the history of science. It seems to me a just source of pride that our country should be called on to take the chief part, both scientific and technical, in such an undertaking, and I will not deny that I am considerably elated by it." Telegrams from Professor Foerster at Berlin and Hirsch of Switzerland, president and secretary, respectively, of the International Bureau, have been received, ratifying all arrangements.

— The Indiana Academy of Science held its annual meeting in the Capitol at Indianapolis, Dec. 30 and 31, 1891, under the presidency of Professor O. P. Hay of Butler University, Irvington, Ind. Owing to the great number of papers entered, it was necessary, throughout the most of the meeting, to meet in two sections: Section A., zoology, botany, and geology; Section B., chemistry, physics, and mathematics. On Wednesday morning and evening general sessions were held. At the latter the president's address on "The Present State of the Theory of Organic Evolution" was delivered. There were ninety-eight papers entered, and under the rules none were permitted on the programme except such as were expected to be read. The committee appointed at the summer meeting of the Academy, at Lake Maxinkuckee, to consider the question of science work in the high schools of the State reported that it had brought the subject to the attention of the State Board of Education, with the result that the presidents of Purdue University and Indiana University were appointed a committee to prepare a circular of instruction, to be distributed by the board to high schools and to school officers. The circular is nearly ready for distribution. The committee appointed to secure the passage by the legislature of an act to protect native birds reported

that such legislation had been secured. The following papers were presented: Some Suggestions to Teachers of Science or Mathematics in High Schools, by T. C. Van Nuys; Notes on Numerical Radices, by C. A. Waldo; The Kankakee and Pure Water for North-western Indiana and Chicago, by J. L. Campbell; Biological Surveys, by John M. Coulter; The Distribution of Tropical Ferns in Peninsular Florida, by L. M. Underwood; Unused Forest Resources, by Stanley Coulter; Preliminary Notes on the Geology of Dearborn County, Ind., by A. J. Bigney; Jefferson County Cystidians, Hudson River Fossils of Jefferson County, Ind., and The Upper Limit of the Lower Silurian at Madison, Ind., by George C. Hubbard; Variations in the Dynamical Conditions During the Deposit of the Rock Beds at Richmond, Ind. (by title), by Joseph Moore; The Relation of the Keokuk Groups of Montgomery County with the Typical Locality, and Comments on the Description of Species, by C. S. Beachler; On a Deposit of Vertebrate Fossils in Colorado, by Amos W. Butler; Topographical Evidence of a Great and Sudden Diminution of the Ancient Water Supply of the Wabash River (by title), and Source of Supply to Medial Moraines Probably from the Bottom of the Glacial Channel (by title), by J. T. Campbell; Notes on a Kansas Species of Buckeye, by W. A. Kellerman; On the Occurrence of Certain Western Plants near Columbus, Ohio, by Aug. D. Selby; Preliminary Notes on the Genus *Hoffmanseggia*, by E. M. Fisher; Preliminary Paper on the Flora of Henry County, Ind. (by title), by T. B. Redding and Mrs. Rosa Redding Mikels; A New Microtome, by George C. Hubbard; Notes on the Organogeny of the Compositæ (by title) by G. W. Martin; Notes on the Development of the Archegonium and Fertilization in *Tsuga Canadensis* and *Pinus Sylvestris*, by D. M. Mottier; Strange Development of Stomata upon *Carya Alba* Caused by Phylloxera, by D. A. Owen; Development of the Sporangium and Apical Growth of Stem of *Botrychium Virginianum*, by C. L. Holtzman; The Flora of Mount Orizaba, by H. E. Seaton; An Apparatus for Determining the Periodicity of Root Pressure, by M. B. Thomas; Condensation of Acetophenone with Ketols by Means of Dilute Potassium Cyanide, Condensation of Acetone with Benzoin by Means of Dilute Potassium Cyanide, and Pyrone and Pyridone Derivatives from Benzoyl Acetone, by Alexander Smith; Carbonic Acid in the Urine, by T. C. Van Nuys and R. E. Lyons; Results of Estimations of Chlorine in Mineral Waters, by Volhard's Method, by Sherman Davis; The Sugar Beet in Indiana, and Forms of Nitrogen for Wheat, by H. A. Huston; A Copper Ammonium Oxide, by P. S. Baker; Di-benzyl Carbinamine, and The Character of Well Waters in a Thickly Populated Area, by W. A. Noyes; Laboratory and Field Work on the Phosphate of Alumina, by H. A. Huston; Recent Archaeological Discoveries in Southern Ohio, by Warren K. Moorehead; Photographing Certain Natural Objects without a Camera, by W. A. Kellerman; Recent Methods for the Determination of Phosphoric Acid, by H. A. Huston; The Digestibility of the Pentose Carbohydrates (by title), and The Action of Phenyl-Hydrazin on Furfural (by title), by W. E. Stone; A Graphical Solution of Equations of Higher Degree for both Real and Imaginary Roots, and On Some Theorems of Integrations in Quaternions, by A. S. Hathaway; The Section of the Anchor Ring, by W. V. Brown; A Note on the Early History of Potential Functions, by A. S. Hathaway; Some Geometrical Propositions, by C. A. Waldo; Some Suggested Changes in Notation, by R. L. Green; An Adjustment for the Control Magnet on a Mirror Galvanometer, and A Combined Wheatstone's Bridge and Potentiometer, by J. P. Naylor; Hysteresis Curves for Mitis and Other Cast Iron, by J. E. Moore and E. M. Tingley; Heating of a Dielectric in a Condenser (preliminary note), by Albert P. Carman; Science and the Columbian Exposition, by J. L. Campbell; Exploration of Mount Orizaba, by J. T. Scovell; Entomologizing in Mexico, by W. S. Blatchley; Distribution of Certain Forest Trees (by title), and Cleistogamy in Polygonium (by title), by Stanley Coulter; The Cactus Flora of the South-west (by title), by W. H. Evans; Methods Observed in Archaeological Research (by title), by Warren K. Moorehead; The Prehistoric Earthworks of Henry County, Ind. (by title), by T. B. Redding; A Review of the Holconotidæ, by A. B. Ulrey; Some Additions to the State Flora from Putnam County, and Connecting Forms Among the Polyporoid Fungi, by L. M. Underwood; On LeConte's Terrapins, *Emys concinna*, and *E. floridana* (by

title), The Eggs and Young of Certain Snakes, and Observations on the Turtles of the Genus *Malochlemys* (by title), by O. P. Hay; The Gryllidæ of Indiana, by W. S. Blatchley; The Outlook in the Warfare Against Infection (by title), by Theodore Potter; Our Present Knowledge Concerning the Green Triton, and The Proper Systematic Name of the Prairie Rattlesnake, by O. P. Hay; The Blind Crayfishes of Indiana, and Remarks on the Crustaceans of Indiana, by W. P. Hay; Notes on *Elaps fulvus*, by A. J. Bigney; Some Observations on *Heloderma Suspectum*, by D. A. Owen; Some Observations on Photomicrography, by D. W. Dennis; Diseases of the Sugar Beet Root, by Miss Katherine E. Golden; Buffalo Gnats (*Simulium*) in Indiana and Illinois, by F. M. Webster; The Development of the Viviparous Fishes of California (by title), and Recent Additions to the Ichthyological Fauna of California (by title), by Carl H. Eigenmann; Some Observations on Indiana Birds, by R. Wes McBride; On Indiana Shrews, and Notes on Indiana Birds, by Amos W. Butler; The Scales of Lepidoptera, by M. B. Thomas; The *Egeria* of Central Ohio, by D. S. Kellicott; Some Insects of Tasmania, and Early Published References to Injurious Insects (by title), by F. M. Webster; The Continuity of the Germ Plasm in Vertebrates (by title), Biological Stations (by title), The Eyes of Blind Fishes (by title), and On the Presence of an Operculum in the Aspredinidæ (by title), by Carl H. Eigenmann; Notes on Indiana Arididæ (description of one new species), by W. S. Blatchley; The Relation of Neucleoplasm to Cytoplasm in the Segmenting Egg (by title), by C. H. Eigenmann and R. L. Green; Plant Zones of Arizona (by title), by D. T. McDougal; Relation of Available Enzym in the Seed to Growth of the Plant, and The Potato Tuber as a Means of Transmitting Energy, by J. C. Arthur; Contributions to a Knowledge of the Grain Toxoptera (*Toxoptera graminum*) (by title), by F. M. Webster. A committee was appointed to arrange for publishing the proceedings of this meeting. Twenty active members were elected.

— The College of Physicians of Philadelphia announces that the next award of the Alvarenga prize, being the income for one year of the bequest of the late Señor Alvarenga, and amounting to about one hundred and eighty dollars, will be made on July 14, 1892. Essays intended for competition may be upon any subject in medicine, and must be received by the secretary of the college on or before May 1, 1892. It is a condition of competition that the successful essay or a copy of it shall remain in possession of the college.

— A complete series of soundings has been taken over the whole bed of the Lake of Geneva, and a report is given in *Cosmos*, Vol. X. No. 9, by the engineer, M. A. Delebecque. The length of the lake is 45 miles and its greatest breadth 8½ miles. Its area is 223 square miles, and the height of its surface above sea-level about 1,230 feet. The bed of the lake is divided into two distinct parts, the Great Lake between Yvoire and Villeneuve, and the Little Lake between Yvoire and Geneva. The bottom of the Great Lake is nearly level over an area of 17½ square miles, and lies at a depth of 169 fathoms. The slopes are more sudden at the eastern end, where the mountains descend more precipitously to the water, the inclination being 48 degrees between Saint-Gingolph and Bouveret, and 56 opposite the Castle of Chillon. The River Rhone has made a deep channel, lined with dykes, in the bottom of the lake. This channel extends in a tortuous course for a distance of 3½ miles from the mouth of the river. Near its commencement it has a depth of 190 feet, and beyond Saint-Gingolph it is still 30 feet deep, where the depth of the lake is 109 fathoms. Its formation is due to the large quantities of alluvium brought down by the Rhone, and to the lower temperature of its waters, which causes them to flow under the waters of the lake. The Dranse, which brings down gravel and stones, as well as mud, to the lake, has formed what is known as a *torrential* delta at its mouth, in the form of a cone, continually advancing further and further into the lake. The Little Lake consists of four depressions, separated by bars of small elevation, projecting from the points of Nernier, Messery, Hermance, and Bellerive. The depths of these basins are 249, 229, 229, and 164 feet, respectively. At the bottom of this portion of the lake are to be found traces of the passage of the ancient Rhone glacier which extended to Lyons.



The bar of Nernier, or at least its upper surface, has at one time formed part of a moraine. A bathymetrical map accompanies the article from which this note is taken.

—Mr. Edgar Richards, who, for the past four and a half years, has been in charge of the chemical laboratory connected with the Internal Revenue Bureau at Washington, D.C., having been peremptorily directed by his physician, Dr. F. Delafield of this city, to abstain from all work for some months in the department, has been forced to resign his position, as the Commissioner of Internal Revenue refused to grant him leave of absence in which to rest. Thus the government loses an efficient and faithful officer. Mr. Richards sails on the 23d of January, by the "Werra," for southern Europe, where he will remain for several months before returning to this country.

—From some further surface and bottom temperatures recently taken by Commander Boulton, R.N., in Lake Huron, A. T. Drummond, in this month's *Record of Science*, concludes that the Georgian Bay forms a great cold water basin, somewhat isolated, not only by its physical surroundings but in the temperature of its water, from the central basin of the lake; that the temperature of its bottom does not, even in summer, rise beyond about 39.2°; and that the flow of cold water from Lake Superior into Lake Huron is divided by the position of the islands in the St. Mary's River and along the north shore of Lake Huron, a part flowing to the Georgian Bay by the north channel, between the Manitoulin Islands and the north shore of the lake, thus keeping up the supply of cold water, whilst another part passes through the Detour and the neighboring channels into the central basin of the lake, but instead of mingling there with the warmer waters from Lake Michigan, appears to flow easterly and south-easterly, forming a barrier to the easterly extension of these warmer Michigan waters, and cutting off the Georgian Bay from their influence. In the same journal, Mr. Drummond also refers to a series of temperatures taken by him during last August in the Yamaska River, Province of Quebec, in order to trace the extent of the influence which water temperatures have upon the surrounding air, and, inferentially—in the case of large bodies of water—upon the agricultural capabilities of the neighboring land. The tests were not sufficiently varied as to time and place to, as yet, warrant definite conclusions, but it can be said in general terms that such rivers, which in winter, in the Canadian climate, are paved with two or more feet of ice, have, in the early days of August, a temperature of 76° to 77° F.; that the air in direct contact with the warm surface of the water has in that month its temperature raised to from 1° to 5° above that of the air directly above, but in more exposed positions; and that this increase of temperature, which is greatest at the point of contact, is at one foot above the surface already to a considerable extent lost.

—Harper & Brothers announce a new and revised edition of Autenrieth's valuable "Homeric Dictionary," translated by Professor Robert P. Keep. The present revision has been performed by Professor Isaac Flagg of the University of California, whose name alone is a guarantee of its excellence. Almost every American Greek scholar of reputation has also aided in the work by suggesting corrections or helpful additions, and no effort has been spared to adapt the volume perfectly to the needs of American and English students. Several important changes of considerable value have also been made. They will publish shortly in the Queen's Prime Ministers series "The Marquis of Salisbury," by H. D. Traill.

—A volume entitled "The Dog in Health and in Disease," by Dr. Wesley Mills, and published by D. Appleton & Co., discusses in detail the history of all the varieties of dogs, their breeding, education, and general management in health, and treatment in disease. The book is adapted for both the veterinarian, to whom the medical care of dogs is usually confided, and the general reader whose interest may be limited to that involved in the ownership of a single animal. The writer is professor of physiology in the faculty of Veterinary Science of McGill University, Montreal, the author of "Comparative Physiology" and other standard

works on allied topics; and is further qualified for his task by the fact that he has, as he states in his preface, "for the greater part of his life studied this noble animal with pleasure and profit to his own nature." The volume contains a large number of illustrations related to the text, and is further embellished by portraits of various dogs of note of many breeds.

—Charles Scribner's Sons announce that the first two volumes to be published in the Great Educators Series will be "Aristotle, and the Ancient Educational Ideals," by Thomas Davidson, and "Loyola, and the Educational System of the Jesuits," by the Rev. Thomas Hughes of Detroit College. The next volume, the fifth, in the University Extension Manuals will be "French Literature," by H. G. Keene of Oxford. They have just published "Ten Centuries of Toilette," translated from the French of A. Robida by Mrs. Cashel Hoey, and uniquely illustrated in colors and in black and white by the author. The unexpected delay in the publication of Edward Whympers' "Travels Amongst the Great Andes of the Equator" has been due to the unusual care and thoroughness with which the author is revising the proofs before allowing the book to go to press. It is thought, however, that the book will be ready for publication in a few weeks.

—Longmans, Green, & Co. are about to publish a new work in two volumes on "The Human Mind," by James Sully, of which the author says in a communication to *Mind*: "The present work is an expansion and further elaboration of the doctrine set forth in the author's 'Outlines of Psychology.' Although the mode of arrangement and of treatment will in the main be found to be similar, the book may be described as a new and independent publication. It is specially intended for those who desire a fuller presentment of the latest results of psychological research than was possible in a volume which aimed at being elementary and practical. Hence much more space has been given to the new developments of 'physiological' and experimental psychology, to illustrations of psychological principles in the phenomena of racial and animal life, of insanity and hypnotism. At the same time, an effort has been made to illustrate the obscurity and debatableness of many of the problems of the science, and to aid the reader in arriving at a judicial conclusion on these points by historical references to the main diversities of doctrine. In this way it is hoped that the treatise will find its proper place beside the 'Outlines.'"

—D. Appleton & Co. will publish immediately the third volume of Professor J. B. McMaster's "History of the People of the United States." The second volume closed with the negotiations regarding the Louisiana purchase. In the new volume, which contains ten chapters, Professor McMaster begins with the discussion regarding the constitutionality of the Louisiana purchase. The first chapter includes a careful presentation of the manners, customs, and special characteristics of the people of New Orleans, and the connection of the New England leaders and of Burr with the Louisiana question. The second chapter treats of the results of the Louisiana purchase, the conspiracy of Aaron Burr, his expedition in the Ohio Valley, and his arrest and trial. The third chapter is devoted to the conduct of the public lands from 1776 to the establishment of the Territories of Illinois and Michigan. The fourth chapter, entitled "The Spread of Democracy," describes the extension of the franchise, the relations of the people and the judiciary, and the presidential campaign of 1804. The fifth chapter, which has for its heading the old cry of "Free Trade and Sailors' Rights," is principally devoted to foreign relations, from the Barbary War to the passage of the embargo. The sixth chapter treats of the "Long Embargo," and closes with the inauguration of Madison. After a chapter on subsequent events, called "Drifting into War," the author pauses for a description of the progress of the people since 1784, showing the changes, political, economical, and social, the development of means of communication, the building up of manufactures, the arguments for protection, the relations of the people to the slavery question, and the Seminole War. In the closing chapter the author pictures the preparations for the War of 1812 and its disastrous opening, with the surrender of Hull at Detroit. The volume contains two maps, an index, and an elaborate table of contents.

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FORTY YEARS OF WHEAT CULTURE IN OHIO.<sup>1</sup>

OHIO lies within the borders of what is known as the winter wheat belt of the United States—a region, the soil and climate of which are especially adapted to the culture of this cereal. The State possesses two great natural arteries of traffic, one on its northern and one on its southern boundary, and before the advent of the railway it was crossed by two lines of canals, each extending from the lake on the north to the river on the south, and affording outlets for its productions that served a very important function in its early history. Lying, as it does, right in the gateway between the East and the West, it has been crossed by line after line of the great transcontinental railways, while its rich mineral resources have caused the building of multitudes of other lines, running in all directions, until its territory is now traversed by a network of railways, aggregating within the State nearly 8,000 miles of main track, besides more than 2,000 miles of sidings.

Under such circumstances it is not surprising that the culture of wheat became at an early date, and has ever continued to be, a leading branch of Ohio's agriculture, and that the State should not only have liberally supplied itself with bread, but have had much to spare.

Because of this relative prominence of wheat culture in the agriculture of the State, the Experiment Station has made the study of wheat a leading feature of its work, and the statistical study now published has been undertaken primarily for the purpose of obtaining such assistance as it might give in the conduct of the station's experimental research. It was hoped that this study might throw some light upon such problems as the relative adaptability to wheat culture of soils of different geologic origin and history, and the effect of differences of latitude, of drainage, and the use of commercial fertilizers, and it is believed that some of the conclusions which it seems to warrant should be carefully considered by the farmers of large areas of the State.

<sup>1</sup> From the Bulletin of the Ohio Agricultural Experiment Station, Nov., 1891.

A glance at the geological map of Ohio shows three broad bands running across the State from north to south. That on the east embraces the coal measures, and extends across nearly one-third of the State; then follows a narrower strip, underlaid with Waverly rocks and bordered by a narrow belt of Huron Shales, while the western half of the State lies over limestones.

As the Waverly rocks are chiefly sandstones or calcareous shales, this formation would offer a sharp contrast between soils of such origin and those derived from limestones, were it not for the fact that, in the case of Ohio, both these formations are covered with a thick bed of glacial drift. The drift, however, is considerably modified by the underlying rocks, and it would seem that if there were any marked differences in the value for wheat culture of soils of the widely different character produced from these different formations it should be indicated in this case.

Omitting the four counties in the north-western corner of the State, which overlie the outcrop of Huron shale in that region, viz.: Williams, Fulton, Defiance, and Henry; the five counties which lie on both sides of the belt of Huron shale, extending north and south through the State, namely: Erie, Crawford, Delaware, Franklin, and Pickaway, and the five counties lying immediately north of the coal region and chiefly over conglomerates, namely: Lake, Geauga, Ashtabula, Summit, and Trumbull, the remaining seventy-four counties have been divided into three parallel belts, according to latitude, and subdivided according as they lie over the limestones, shales, or coal measures, making nine groups in all.

In the northern belt are included twelve limestone counties, viz.: Lucas, Ottawa, Wood, Sandusky, Paulding, Putnam, Hancock, Seneca, Van Wert, Allen, Hardin, and Wyandot; seven counties over the Waverly, viz.: Lorain, Cuyahoga, Huron, Medina, Richland, Ashland, and Wayne, and six counties over coal, viz.: Portage, Mahoning, Stark, Columbiana, Holmes, and Carroll.

In the middle belt are eleven limestone counties, viz.: Mercer, Auglaize, Marion, Shelby, Logan, Union, Darke, Miami, Champaign, Clark, and Madison; four Waverly counties, viz.: Morrow, Knox, Licking, and Fairfield, and seven coal counties, viz.: Coshocton, Tuscarawas, Harrison, Jefferson, Muskingum, Guernsey, and Belmont.

In the southern belt are twelve limestone counties, viz.: Preble, Montgomery, Greene, Fayette, Butler, Warren, Clinton, Highland, Hamilton, Clermont, Brown, and Adams; three Waverly counties, viz.: Ross, Pike, and Scioto, and twelve coal counties, viz.: Perry, Morgan, Noble, Monroe, Hocking, Athens, Washington, Vinton, Meigs, Jackson, Gallia, and Lawrence.

It appears that in the northern belt the counties over Waverly rocks have given a larger average yield over the entire forty-year period under review than those in the same latitude, which are underlaid with limestones or with the rocks of the coal measures, and that the rate of increase in yield during the past twenty years is also larger in the counties over the Waverly.

In the middle belt the result is just the opposite: the limestone counties show the larger yield and the greater rate of increase.

In the southern belt the limestone counties show the larger yield, but the Waverly counties show a greater rate of increase.

The counties overlying the coal measures stand below either of the other divisions in yield per acre in each of the



belts, the difference increasing in the more southerly latitudes. In rate of increase they stand between the other two divisions. The topography of these hilly, coal counties is a sufficient cause for their lower yield, and is probably the chief cause, as the rocks of the coal measures comprise both limestones and shales, and it is probable that the soils derived from them are not naturally inferior in fertility to those found in the remainder of the State.

As between the soils lying over limestones and those over shales, these statistics do not yet justify any opinion regarding their respective adaptation to the production of wheat. It is probable, however, that the middle and southern belts of counties afford a more just basis of comparison between the two geological formations than the northern belt, because in this northern region the overlying drift has been derived, to a large extent, from the rocks excavated from the lake basin, and which are both limestones and shales.

Within twenty years the area annually sown to wheat in Ohio has increased from an average of 1,800,000 acres during the eighth, to 2,500,000 acres during the ninth decade. This area represents twelve per cent of the area in farms within the State, but several counties are sowing annually 18 to 20 and even 25 per cent of their farm lands to wheat. In 1881 a total area of 2,800,000 acres was sown, and there is no good reason to doubt that with the continued clearing away of the forest and the reclamation of waste lands by drainage it will soon be possible to devote as much as 3,000,000 acres to wheat without infringing upon any other agricultural interest, and this, even though the hill counties should reduce their acreage by one-half. Such an increase, at the present rate of production, would represent an annual product of 40,000,000 bushels.<sup>1</sup>

But it is not to be supposed that Ohio farmers will rest content with a yield of only thirteen bushels of wheat per acre. The northern third of the State has increased its average yield within forty years by nearly three bushels, and the middle third by from one to two bushels, and it is reasonable to expect a similar increase within the next forty years, notwithstanding the fact that the rate of production seems just now to be at a standstill. It is to be expected that progress in this, as in other matters, will be more or less spasmodic, and that its actual rate can only be measured at long intervals; but it is not impossible that the time may come when the average from the entire State will equal the present average of Summit county, which means a total average production of about 60,000,000 bushels, or bread for twelve million mouths. Such a yield would be far below what has been attained in Great Britain, where the average yield is now 28 bushels or more per acre and is steadily increasing. This high yield is not due solely to the superiority of the soil and climate of that country, for the time has been when the average yield of Great Britain was very much smaller than it is at present.

Ohio's population has increased by a little more than two millions since 1850, while the total wheat yield has increased by an average of more than 14,000,000 bushels per annum, comparing the average of the first decade with that of the decade 1850-9, so that production is keeping far ahead of any possible consumption within the State. Production will eventually reach a limit, while population may expand indefinitely, but at present rates of increase, both of population and of wheat production, it will probably be several centuries before Ohio shall contain enough people to consume all her wheat.

What is true of Ohio is true to a greater or less extent of the entire winter wheat belt of North America. The area now sown to wheat in this region may be expanded largely without infringing upon other productions, and the rate of yield may and will be very materially increased by better husbandry, including an intelligent use of manures and fertilizers, and more thorough drainage.

Let there be given a little stimulus in the shape of higher prices for wheat and we shall see a rapid expansion in the total production in this country, while there are still undeveloped regions in South America, south Africa, and Australia, which will eventually be made to add largely to the world's supply of breadstuffs.

This is not said by way of discouragement. I believe that the future outlook for the Ohio wheat grower is eminently a hopeful one, but I do not expect to see the very great increase in price of wheat that is being predicted by certain statistical writers. In my judgment, the great opportunity for the Ohio wheat grower lies in increasing the yield per acre, in reducing the cost of production, and in improving the quality of the grain. Such a course will render him independent of the market, and then if higher prices do come he will be doubly benefited.

It appears from this statistical study of the wheat harvests of Ohio that the average yield of wheat is increasing in the northern and central sections of the State, while it is at a standstill, and standing at far too low a point for profit, in the southern and south-eastern counties.

It would seem that the profitable culture of wheat on the steep hillsides of southern Ohio is a hopeless undertaking; that the great problem before the wheat grower of the central belt of counties is winter-killing, a problem which may be partially solved by underdrainage and the intelligent use of clover and manures; and that in the northern counties climatic influences are more generally favorable to wheat culture than elsewhere in the State.

The statistics indicate that the wheat crops of Ohio have been slightly increased by the use of commercial fertilizers, but it appears that the average cost of this increase has equaled its market value, and that a general improvement in the methods of agriculture has contributed more largely to the increase of Ohio's wheat crops than the use of purchased fertility.

It would seem that the total area under wheat might be considerably enlarged, and at the same time more closely restricted to lands adapted to tillage, and that the yield per acre may be so increased that the total product shall reach double the quantity now annually produced.

CHAS. E. THORNE.

#### THE ANTHROPOLOGY OF EUROPE.

"THE Anthropology of Europe" was the title of a course of lectures (the Rhind lectures) delivered in Edinburgh last October by Dr. Beddoe, ex-president of the Anthropological Institute of Great Britain, of which we find the following brief abstract in the *Scottish Geographical Magazine*: Dr. Beddoe, in his earlier lectures, dwelt chiefly on some of the problems of anthropology, briefly on the question of priority of dolichocephalic or brachycephalic types, briefly also on the great Aryan question, and at greater length on that of the influence of environment, towards modifying of types, to which he repeatedly referred during subsequent lectures. He noted the very frequent occurrence of broad, even very broad, skulls in conjunction with very narrow ones in some of the earlier, if not the earliest, "finds," a circumstance not

<sup>1</sup> 48,000,000 bushels were harvested in Ohio in 1888.

yet sufficiently explained. He showed that we knew very much more about the succession of races and the details of ethnography, where these related to western Europe, especially to France, because these parts were inhabited, owing to the geological conditions, earlier than the north-eastern portions of Europe, while in the east and south-east generally, and in Spain, anthropological science was not sufficiently advanced, or political circumstances intervened, and investigators were few. With respect to the Aryan question, he pronounced no very decided opinion, though he spoke of certain doctrines on the original habitat as the Scandinavian and Lithuanian heresies; and he showed some inclination towards that view which looks on the Galchas as representing the ancestors of the Iranians and of the people who brought the Aryan languages into Europe, in which case the brachycephals of the central mountain chains, the Carpathians with the Balkans, Bohemian Mountains, the Alps, Jura, Vosges, Cevennes, etc., may be looked on as retaining much of the original Aryan blood, seeing that their physical characteristics have a general resemblance to those of the Galchas. He discredited the argument that because the Aryan-speaking inhabitants of Europe were more numerous than those of Asia, it was much more easy to derive the latter from the former, the less from the greater, than *vice versa*, remarking that on the same principle we should derive the English from North America and the Portuguese from Brazil, and that it was not at all unlikely that about the dawn of history, when Asia was thickly and Europe comparatively thinly peopled, the proportions were quite different, especially as at that time the Iberians were still unorganized as to language. With regard to the influence of environment he quoted Kollmann of Basel's five types:—

1. Long-headed long-faced, the Grave-row or Germanic, etc.,
2. Broad-headed long faced, the Disentis or Sarmatic,
3. Long-headed broad-faced, the Cro-Magnon,
4. Broad-headed broad-faced, the Turanian,
5. Mesocephalic broad-faced,

but said he thought the types too few and the limits too absolute and precise as to figures.

He showed the extreme divergence of views on this subject of environment, — noting how Kollmann denied any change of types, or material progression therein, since the period when we knew anything of man in Europe, saying that man was fit for anything when he first appeared here, and that for the establishment of permanent varieties we must look further back, perhaps even into the Miocene age.

On the other hand, Schaaffhausen, Ranke, and, to a less decided extent, perhaps Virchow himself, assign very great importance to environment. The first indicates a large number of points of inferiority as occurring together or separately in the old dolichocephals, and believes that in Germany, if not elsewhere, heads are gradually growing broader with increasing intelligence and civilization, while Ranke thinks that in Bavaria, in some unexplained way, the inhabitation of mountain regions has a tendency to broaden and shorten the head, and that, where race concurs with environment, as in the once-slavonic hill-country of Upper Franconia, the tendency is still more marked, as from a double influence. Dr. Beddoe then went briefly through the history of the successive expansions and "swarmings" or migrations of the several races who have successively been active in Europe,—the Phœnicians, the Greeks, the Gallo-Kelts, the Romans, the Germans, the Slavs, the Saracens, and the Turco-Tartar tribes, and their share in modifying race-distribution.

Proceeding to consider the history and ethnology of Russia, he stated his opinion that the Scythians, if not altogether Turanian, were a mixed race into which a Turanian element entered, and who ruled over other tribes of different descent from themselves. The ancient skulls had not been found or preserved in great number, but they were almost all long, up to the Slavonic period, when they became rather broad, very much what they are at the present day. The Merians around Moscow were a Finnish tribe, who about the tenth or eleventh century were being subdued or incorporated by the encroaching Muscovites, and who finally disappeared; they were tall and strong, but pacific in habits, and, though they had commerce with the Arabs and Bulgarians, were comparatively poor. The history of Russia was one of gradual absorption of Finnish tribes, interrupted for a long period by the great invasion and domination of the Mongols of the Golden Horde. The numerous Finnish tribes seemed to have something common in their physiognomy, but differed very much in their indices of head-breadth, and also to some extent in complexion, some having dark hair, others to a large extent fair or brown, and some a large percentage of red hair, e.g., the Votiaks and Voguls, who are incorrectly said to be all red-haired.

Dr. Beddoe thought the Illyrians probably furnished the principal source of the black-haired folk in the Balkan Peninsula; they were also broad-headed. He entered into some details as to the changes in the Greek type and the history of the Thracians, as well as of the colonization of Bulgaria by the people who now bear that name.

With regard to Scandinavia he quoted the discrepant views of Montelius and Aspelin, the former doubting or denying the arrival of any new race since the neolithic period, the latter tracing the true Swedes to the Rhoxalani (Red-men in Finnish), whom he supposed to have entered Sweden about the fourth or fifth century.

In treating of Germany he entered pretty fully into the question of the change which appears to have taken place in the physique of the Bavarians and Swabians since the Marcomanni and Alemanni occupied these countries, quoting the different opinions of Von Hölder and Ranke on the subject, and especially the investigations of the former at Ratisbon.

In France and Belgium the clearest and most conclusive mass of anthropological fact was supplied by the investigations of Vanderhindere and Houzé into the color, head-form, stature, etc., of the Belgians. A line drawn east and west between the Flemings and the Brabanters and the Walloons separated two races differing in language, color, stature, head-form, and length of nose, and that in the sharpest manner. In France Dr. Beddoe also mentioned the inquiries of Broca and Boudin into stature, of Topinard into color, and of Collignon into head-form, and their remarkable results; and in Spain those of Don Telesforo de Aranzadi y Unamono, into the physical characteristics of the Guipuzcoan Basques, whom he believed not to be a pure race, but a mixture of three distinct elements. In Italy he showed how the stature and the head-breadth decreased gradually from north to south, and how the Sards were probably the purest breed in Europe, and the best representatives of the Mediterranean or southern race; also how closely the modern seemed to resemble the ancient Romans. In Britain he selected for special remark Pembrokeshire and the Isle of Man, and analyzed the indications of stature, color, and head-form in the Manxmen, who were a cross-breed between the Gael and the Norseman in all these respects. In Scotland he selected for special remark the people of Berwickshire and of Ballachu-



lish, showing that, though not very dissimilar in head-form, they were strongly distinguished in color of hair. He expressed his belief in the presence of a Finnish or Ugrian element in the population of Scotland, which was also found in Wales, and was marked among other characteristics by oblique eyes. The Iberian element, which had doubtless been strong among the Picts, continued to be so in many parts of Scotland, for example, in Wigtownshire and the upper part of Aberdeenshire, and in a great part of the Highlands.

The concluding part of the last lecture was devoted to an appreciation of the three (or, counting the Finns, four) great races which now divide Europe, of which the central, Alpine, brown, thick-set, broad-headed race seems the one most likely to spread at the expense of its neighbors. The question of race *versus* environment was also summed up, to the advantage, on the whole, of the former.

#### THE ABORIGINAL NORTH AMERICAN TEA.<sup>1</sup>

THERE is a shrub or small tree, a species of holly (*Ilex cassine*), growing in the Southern States along the seacoast, not extending inland more than twenty or thirty miles, from Virginia to the Rio Grande. Its leaves and tender branches were once used by the aboriginal tribes of the United States in the same manner as the Chinese use tea and the South Americans use maté. But while the use of *Thea sinensis* and *Ilex paraguayensis* still survives, the use of the shrub above mentioned has been almost abandoned by our native Indians and by the white people who once partially adopted it as a beverage.

The reason for its disuse is hard to discover, for, in common with tea and maté, it contains caffeine, or a similar alkaloid. The object of this paper is to examine its history, to suggest its restoration to a place among the stimulant beverages, and to inquire into its possible economic value.

I have been able to trace its use as a beverage back to the legendary migration of the Creeks from their supposed far western home to the seacoast of the Carolinas. Whether it was used by the prehistoric mound builders is a question which may not at present be solved. But some archaeologist of the future may find in the remains of the mound-builders or their predecessors proof of its use among them.<sup>2</sup>

The leaves and young tender branches were carefully picked. The fresh cassine was gathered at the time of harvest or maturity of the fruits, which was their New Year. The New Year began with the "busk," which was celebrated in July or August, "at the beginning of the first new moon in which their corn became full eared," says Adair. The leaves were dried in the sun or shade and afterwards roasted. The process seems to have been similar to that adopted for tea and coffee. The roasting was done in ovens, remains of which are found in the Cherokee region, or in large shallow pots or pans of earthenware, such as the Indian tribes made.

These roasted leaves were kept in baskets in a dry place until needed for use. Loudonniere (1564) writes of being presented with baskets filled with leaves of the cassine.

Was it an article of commerce? There seems to be no doubt on this subject. Allusions to the drinking of the "black drink" are found, indicating its use among tribes residing at a long distance from the habitat of the cassine.

Lawson (1709) writes of its being "collected by the savages of the coast of Carolina, and from them sent to the westward Indians and sold at a considerable price." Dr. Porcher,

<sup>1</sup> Abstract of Bulletin No. 14, U. S. Department of Agriculture, Division of Botany, Edwin M. Hale, M.D., Chicago, Ill.

<sup>2</sup> This was written before Professor Venable's recent investigations.

author of the "Resources of the South," says: "The Creek Indians used a decoction of the cassine at the opening of their councils, *sending to the seacoast for a supply*," and adds that the coast Indians sent it to the far west tribes. How far its use extended northward, I cannot ascertain. From some allusions of the early French writers, I think it was used by the Natchez, and that it was sent up the Mississippi from the coast of Louisiana. The Indians of Wisconsin, Illinois, and westward, used a decoction of willow leaves as a beverage, but I cannot find that they used it in ceremonials, or that it was looked upon with the same reverence.

It appears from the accounts of various early writers that there were several methods of preparing the black drink.

(1) The decoction made of the fresh leaves and young branches.

(2) A decoction of the dried and roasted leaves. It is probable that the leaves during roasting developed new qualities, as the roasting of coffee brings out the aromatic odor due to a volatile oil.

(3) A decoction which was allowed to ferment. In this condition it became an alcoholic beverage, capable of causing considerable intoxication, similar to that caused by beer or ale.

The early history of the use of *Ilex cassine* as a beverage is lost in the darkness of prehistoric ages. Probably the same can be said of tea, coffee, maté, and cocoa. But it is a singular fact that while all the latter beverages still continue to be used in the countries where they are indigenous, as well as all over the world, the use of cassine is nearly extinct, as it is now only used occasionally in certain important religious ceremonies by the remnants of the Creek Indians, and will disappear with them unless rescued by chemical research and its use revived for hygienic or economical reasons.

The very earliest mention of cassine was made in the "Migration Legend of the Creek Indians." This curious legend has been lately published by A. S. Gatschet of the Bureau of Ethnology, Washington, D.C., with text, glossaries, etc. In his preface he says: "The migration legend of the Kosihta tribe is one of the most fascinating accounts that has reached us from remote antiquity and is mythical in its first part." This tribe was a part of the Creek nation. Its chief, Tchikilli, read the legend before Governor Oglethorpe and many British authorities in 1735. It was written in red and black characters (pictographic signs) on a buffalo skin. This was sent to London, and was lost there; but, fortunately, a text of the narrative was preserved in a German translation.

It begins by narrating that the tribe started from a region variously supposed to be west of the Mississippi, or in southern Illinois, or southern Ohio. They travelled west, then south, then south-east, until they reached eastern Georgia. Here they met a tribe, called in the legend the "Palachucolas," who gave them "black drink" as a sign of friendship, and said to them, "Our hearts are white, and yours must be white, and you must lay down the bloody tomahawk, and show your bodies as a proof that they shall be white."

This was evidently the first knowledge the Kosihta tribe had of this beverage.

The black drink made by the Seminoles is described as "nauseous to the smell and taste, and emetic and purgative." It is a mixture and not brewed of the cassine alone. All our beverages, such as tea, coffee, maté, and even chocolate, when drunk very strong, are capable of causing diuresis, purging, and vomiting.

One peculiarity of the drinking of the black drink is that, so far as I can ascertain, it was not used at their meals as we use tea and coffee, but wholly as a social beverage or at festivals and other public occasions. I do not think the women were allowed to drink it, at least not publicly. Authorities differ on this point.

Among the Creeks the women sometimes prepared the black drink, but Narvaez writes that the Indians on the coast of what is now Texas did not allow a woman to come near it during its preparation.

That a beverage containing caffeine should fall into disuse and become almost forgotten is a singular fact. The use of maté has not decreased from the time of the conquest of South America by Europeans. The reason why the latter is still in use and the former not lies, perhaps, in the fact that the Europeans in South America mixed with the natives, married, and adopted their customs, while the English and French who settled the Gulf States did not associate with the Indians, and adhered to the use of Chinese tea. Now that we know that the leaf of the cassine contains caffeine or theine, can its use as a beverage be revived?

It is not as pleasant in odor and taste as *Thea sinensis*, and this may be against it; on the other hand, it seems to have some salutary properties which the latter does not possess, and may, perhaps, be far more cheaply obtained.

A rough estimate can be made as to the number of square miles upon which it grows. Estimating the coast line from the James River, in Virginia, to the Rio Grande, in Texas — about 2,000 miles — and multiplying this by 20 miles, the extent of its growth inland, we get a total of about 40,000 square miles. On this area could be picked an immense quantity of leaves, and if the trees are not destroyed in the picking the crops could be harvested every year. No estimate can be approximated even of the amount of the crop of leaves which could be gathered, because we can not estimate the number of trees on this area.

It would seem possible that further inquiries on this point and careful experiments in cultivation and manipulation might result in furnishing our market with a product which would be found in many cases an acceptable and useful substitute for the more expensive imported teas.

#### LETTERS TO THE EDITOR.

\*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

#### Rain-Making by Concussion in the Rocky Mountains.

In connection with the recent discussions of the effects of explosions in producing rain, it ought to be noted that for twenty years or more the Rocky Mountains have afforded excellent opportunities for observing the effects upon rainfall of heavy explosions at high elevations. There are in this region thousands of mines, mining claims with open cuts and adits, and quarries at elevations from 5,000 to 13,000 feet. Nitro-glycerine preparations are now the explosives used in blasting. During the summer there is a great amount of blasting high on the mountains. Several railways and wagon roads reach 9,000 to 12,000 feet, and the grading of these afforded much blasting. I have made considerable inquiry and found no one who had observed any connection between the explosions and rain-fall. Probably few or none were especially on the watch for such connection, but if there were any very obvious connection it would have been observed, since there have been so many years of opportunity.

About two years ago the cog-wheel road was graded to the top of Pike's Peak. Thinking that explosions on a high isolated

mountain, rising far above the adjacent country like Pike's Peak, would produce rain if anywhere, I especially noted the weather. Tremendous explosions occurred daily for some months. The reports were often heard 30 to 40 miles, and many of them were at elevations between 13,000 and 14,147 feet. Yet all this happened in one of the driest years ever known in Colorado, when often for days or weeks there was no precipitation even on the mountains.

G. H. STONE.

Colorado Springs, Jan. 12.

#### Rain-Making.

In *Science* for Nov. 27, 1891, appeared an article from the pen of Professor Lucien I. Blake of the State University of Kansas, entitled "Can We Make it Rain?" in which some suggestions are made as to the proper method of conducting experiments to that end, drawn from the discoveries of Mr. John Aitken of Scotland, who has shown that unless there be dust particles in the air the aqueous vapor therein contained will not, in condensing, form itself into drops. Professor Blake argues from this that, instead of using guns or apparatus for producing terrific noises, the better way would be to send up inexpensive fire balloons carrying impalpable powders, which could be thus scattered through the air; or else carrying sulphur or gun-powder, the smoke of which, when they were ignited, would furnish the dust particles, which, it is assumed, are the only requisites for artificially setting in motion the process of nature that brings rain.

The reasoning of Professor Blake in leading up to this conclusion and in combatting the idea that concussion is a necessary factor in artificial rain production, contains much that appears sound from the standpoint of both science and good sense, and yet much that will not bear examination. His contention that thunder does not, to any extent, cause condensation of vapor, but is rather the result of it, is one which I have always held to, for latent heat is given out by condensing vapor, and this heat may appear in the form of electricity, and cause the lightning-flash that makes the thunder. The idea, also, that powder smoke may be a factor in rain production when rain is caused by a battle, is a logical deduction from Mr. Aitken's discovery. Professor Blake also avoids the blunder committed by Professor Simon Newcomb, in his article in the October number of the *North American Review*, where the latter lays himself open to the imputation of being himself guilty of the very thing he charges against the advocates of the concussion theory, viz., of "ignoring or endeavoring to repeal the laws of nature." This he does by asserting that ten seconds after the sound of General Dyrenforth's last bomb had died away "everything in the air — humidity, temperature, pressure, and motion — was exactly the same as if no bomb was fired," thus abolishing at one stroke the principle of the conservation of forces. Professor Blake, with less zeal but greater wisdom, practically admits that the forces brought into action by explosions are resolved into heat, and he does not, like Newcomb, annihilate this heat, though unwilling to admit that it can do work. Professor Blake also has the good sense to recognize the fact that the question of artificial rain production cannot be settled by laboratory experiments — a thing that cannot be said of all the assailants of the concussion theory.

But his contention that if concussion causes rain "the greatest effect — the practical effect — must follow close upon the concussion," cannot be sustained. While I reserve for a more extended article to be published elsewhere a full consideration of this question, I will here say, briefly, that the well demonstrated theory of the late Professor M. F. Maury that there are two great atmospheric currents, the equatorial and the polar, flowing above us in nearly opposite directions, furnishes the basis for a perfect explanation of the reason why the centre of the atmospheric disturbance caused by a battle should remain in the vicinity of the battle-field while the two currents are mixing together and initiating the process that leads to rain — a process which, it is plain, must require time in reaching a state of effective action.

But these points in the discussion are not so much what I desire to consider at this time as the special method recommended by Professor Blake for conducting rain-making experiments. The



advocates of the concussion theory welcome any discoveries that can add to our knowledge of the reasons why battles cause rain, and thus suggest methods for producing it which may be an improvement on these suggested by the battles and their sequences. In this category appears to be the discovery of Mr. Aitken referred to, but it furnishes nothing conclusive on the subject, and, in my opinion, an experiment on the line marked out by Professor Blake would prove a failure. If some of us go to one extreme in relying too much on concussion as the means by which the process of nature that leads to rain can be set in motion, so does Professor Blake go to the other extreme in holding that it is smoke or dust particles alone that can artificially effect that result. We know, as a matter of fact, that simply throwing smoke into the air does not produce rain. There are scores of cities in our land whose chimneys are doing this every day, and yet they do not produce rain. And it cannot be said that the smoke they send up is not of the right kind. It contains a great deal of sulphur and of carbon, and these, according to Professor Blake, are among the substances which form dust particles, around which molecules of aqueous vapor most readily collect.

In the light of Mr. Aitken's discovery, however, I am willing to admit the possibility that smoke may not be without its effect in producing the rain that follows battles—an idea, I may add, which, though not original with me, I placed on record over twenty years ago, as may be seen by reference to the letter of Gen. Robert A. McCoy, in the appendix to "War and the Weather." In any future experiments in the field the application of the principle discovered by Mr. Aitken ought to be duly tested. But I see no reason as yet for doubting that force, exerted by means of explosions and expended on the earth and air, is a necessary factor in artificial rain production.

El Paso, Tex., Jan. 15.

EDWARD POWERS.

#### Eye-Habits.

In *Science* of Dec. 18, 1891, p. 839, is a note taken from *Nature*, and referring to some experiments of Mr. James Shaw to test the ability of school children to keep one eye open and the other shut at the same time. Having been associated with school children for many years where the microscope was frequently used in the class-room for demonstration, my attention has often been called to their proceedings in this respect, and the impressions may be worth recording, though they are, no doubt, essentially like those of many other teachers in analogous positions. As the use of the microscope was only for a short time to each individual in a particular exercise, it was necessary that an observer looking into the tube of a monocular should by some means close one eye in order that other objects might not be in the field of view of the unoccupied eye and confuse the image. For it requires long practice on the part of one using a monocular stand to examine an object while keeping both eyes open and not be inconvenienced, a training out of question with school children where the time was limited. In the case of such the eye was closed either with or without the use of the hand. Being pupils in a high school their ages ranged from fourteen to twenty or more, the majority from fifteen to eighteen. Statistics were not kept, but I do not recall an instance where a boy could not close one eye without the aid of the hand. If it occurred, it was very rare. But it was quite common for girls to make use of the hand for this purpose, a fourth or more, as mentioned by Mr. Shaw for school children.

Sometimes, by request of teachers in primary grades, I have taken a microscope to their rooms, in which the lowest classes were taught, their ages being from six to eight or nine. It was for the purpose of showing something which the teachers desired to use as an object-lesson, like the eye or foot of a fly, or the scales from the wing of a butterfly, things whose forms they readily comprehended, as was shown by their description of them. With them the unaided closing of one eye was exceptional, some of the older boys, perhaps, being able to do so. I have noticed the same difficulty with older people who occasionally look through a microscope; the inability to shut one eye and leave the other open being among the women. This was illustrated but a short time

since by a lady nearly eighty years old. She had recently had one eye treated for cataract, and was told to test the perceptive power of it. In order that there might be no interference by the other eye, this was covered by the hand.

This habit of peeping, or looking with one eye open and the other closed, is plainly an acquired one, becoming easy by practice, as is seen by comparing children with adults, and men and women with each other. The difference in the latter is mostly due to the lack of use. Boys early become accustomed to "sighting" in various ways in their play, as in the use of the cross-bow or bow and arrow, toy gun or real gun, or they may wish to line something. They also work more with tools, and, like a carpenter, must see if they are making a straight edge, and thus acquire this ability. There being less occasion for it on the part of girls and women, they may fail to gain it at all. This is not from inherent inability any more than in the case of men, unless heredity becomes a factor working through sex, and facilitating the process.

E. J. HILL.

Englewood, Chicago, Jan. 14.

#### BOOK-REVIEWS.

*Chambers's Encyclopædia*. New edition. Vol. VIII. Peasant to Roumelia. Philadelphia, Lippincott. Royal 8°. \$4.

COMMENT on this encyclopædia may seem almost superfluous, not only because the work is well known, but also because of the uniform excellence of its several volumes; yet one does not like to pass it by without remark. The present volume is noteworthy for the number of its articles on philosophical and religious topics; Professor Andrew Seth writing on Philosophy, Professor D. G. Ritchie on Plato, Professor Sorley on Psychology, Mr. James Oliphant on Positivism, Professor Flint on Religion, Rev. W. L. Gildea on Roman Catholicism, Professor Cheyne on the Book of Psalms, etc. In the very different department of the industrial arts we find articles on Photography, by T. C. Hepworth and W. T. Bashford; on the Plough and the Potato, by James MacDonald; on Pottery, by James Paton; on Printing, by John Southward; and a long one on Railways, by E. M'Dermott. In science strictly so called, Professor Peile treats of Philology, Mr. Norman Wyld of Plants and of Physiology, Professor Knott of Quaternions, Dr. Alfred Daniell of Reflection and Refraction, Mr. J. A. Thomson of Protoplasm and of Reproduction; while the minor articles are too numerous to mention. In history and geography the most important papers are perhaps those on Phœnicia, by Canon Rawlinson; on Rome, by Canon Taylor and Dr. Steele; and on Persia and Persepolis, by Gen. R. Mordoch Smith. In this department it seems to us that there is a deficiency of maps. Political and social themes receive their share of attention, Mr. T. Kirkup treating of Political Economy, Mr. Jesse Collings of Peasant Proprietors, Mr. W. C. Smith of the Poor Laws, Sir E. F. Du Cane of Prisons, and Mr. W. Draper Lewis of Protection. Literature and the ideal arts are less conspicuous in this volume than in some of the previous ones; but Mr. Edmund Gosse writes of Poetry, Mr. Stead of Periodicals, Sir Joseph Crowe of Raphael, Mr. P. G. Hamerton of Rembrandt, and Mr. W. Holman Hunt of Pre-Raphaelitism. The number of minor articles on all subjects is so great as to preclude all mention of them individually; yet it not unfrequently happens that these are the most useful of all to the reader. It is expected that the two remaining volumes of the *Encyclopædia* will appear during the present year.

#### AMONG THE PUBLISHERS.

THE new volume of the Badminton Library, announced by Little, Brown, & Co. for immediate publication, will treat of skating, curling, tobogganing, and other out-door sports. It is written by J. M. Heathcote, C. G. Tebbutt, T. Maxwell Witham, and the Rev. John Kerr, Ormond Hake and Henry A. Buck, and contains several plates and numerous illustrations in the text, by C. Whymper and Captain Alexander.

— John Wiley & Sons announce as in preparation "Elementary Lessons in Heat," by Professor S. E. Tillman, United States Military Academy, West Point.

tary Academy, and "Elementary Course in Theory of Equations," by C. H. Chapman, Johns Hopkins University.

— A. Lovell & Co., New York, have begun the publication of a series of American History Leaflets, to be issued bi-monthly. The first contains Columbus' letter to Luis de Sant Angel, announcing his discovery.

— Houghton, Mifflin, & Co. have just published the third volume of Sargent's important work on the Silva of North America. It will include Anacardiaceae-Leguminosae, and, like the previous volumes, will contain fifty plates drawn and engraved with the utmost skill.

— Charles H. Sergel & Co. announce a series of histories of the Spanish-American Republics. The first volume, which will be issued in February, will be "Peru," by Clements R. Markham. It will be followed in a short time by "Brazil," by William E. Curtis. "Argentine," by the Author of "An Earnest Trifler," and other volumes will be issued at intervals of two or three months.

— Longmans, Green, & Co. have published a small atlas prepared by Professor A. B. Hart of Harvard University and entitled "Epoch Maps Illustrating American History." It is primarily designed as a companion to the series on "Epochs of American History" published by the same house, of which Professor Hart

is the editor. The author says that it is "an attempt to make maps from the records — from the texts of grants, charters, and governors' instructions, and from statutes, British, colonial, state, and national." It opens with a map showing the physical features of the United States, followed by several illustrating the early discoveries and settlements, and others showing the growth of the national territory, the settlement of disputed boundaries, the growth and abolition of slavery, the civil war, and various other phases of our national history. There are, however, no maps of particular regions of special historical importance, such as New Jersey in the Revolution and Virginia in the civil war — an omission that is to be regretted. But the maps that are given are excellent, and as history without maps is almost unintelligible, they will be useful to historical students.

J. B. Lippincott Company have just published a second edition of Goubaux and Barrier's "The Exterior of the Horse," translated by Dr. Simon J. J. Harger of the University of Pennsylvania. This edition has been in preparation for three years, involving many alterations, which in most cases amounted to almost a transformation of the old text into entirely new matter. A new plate upon the age, by G. Nicolet, and fifty-three original figures have been added, making the total 346 figures and 34 plates.

— Benjamin Sharp, Ph.D., will tell in the February *Scribner* some results of his Greenland explorations last summer. He describes what Sir John Ross, who discovered them in 1813, called

#### CALENDAR OF SOCIETIES.

**Philosophical Society, Washington.**  
Jan. 16. — W. J. McGee, The Gulf of Mexico as a Measure of Isostasy.

**Society of Natural History, Boston.**  
Jan. 20. — Charles V. Riley, Life-History of *Sphecius speciosus*, Drury; Notes on Caprifig; S. H. Scudder, The Tertiary Weevils of North America.

**Chemical Society, Washington.**  
Jan. 14. — Officers were elected: President, Dr. T. M. Chatard; vice-presidents, Dr. F. P. Dewey and Mr. W. H. Krug; treasurer, Dr. E. A. von Schweinitz; secretary, Dr. A. C. Peale. The following were elected additional members of the executive committee: Professor F. W. Clarke, Professor H. W. Wiley, Mr. Cabell Whitehead, and Professor R. B. Warder. The following papers were read: H. W. Wiley and K. P. McElroy, Midzu-Ame; W. F. Hillebrand, Zinc-Bearing Spring Waters from Missouri.

**Appalachian Mountain Club, Boston.**  
Jan. 13. — Herbert Dyer, Camping in the Highest Sierras.

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— It has been known for some time past that M. Ernest Renan was engaged in writing a volume of reminiscences. The book is now finished, and by arrangement with the author will soon be published by the Cassell Publishing Company under the title "Recollections, Letters, and Addresses." The translation has been done by Miss Isabel F. Hapgood.

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